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TECHNICAL REVIEW AND EVALUATION AIR QUALITY PERMIT NO. 41526 *Phelps Dodge Miami, Inc.*

I. INTRODUCTION

This is a renewal Class II synthetic minor permit for existing Permit No. 1000442 issued to Phelps Dodge Miami Inc. for a metallic mineral processing plant in Miami, Arizona. This plant extracts pure copper metal from ore. The operation consists of excavation of copper ore from the ground; heap leaching, and solution extraction/electrowinning (SX/EW) plant to produce copper.

A. Company Information

Facility Name: Phelps Dodge Miami Mine

Mailing Address: P.O. Box 4444
Claypool, Arizona 85532

Facility Address: Hwy 60, North of Miami,
Miami, Gila County, Arizona 85532

B. Attainment Classification

Miami area is currently designated as a non-attainment area for PM₁₀.

C. Learning Sites Evaluation

There are 2 (two) schools within 2 miles of the facility.

D. Background Information

The facility was issued Permit No. 0314-84 on August 1, 1984. The current permit (Permit No. 1000442) was issued on June 3, 2002. A minor permit revision no. 35986 for operation of 2 (two) 400 KW portable emergency generators was issued on September 1, 2005. Subsequent to the current permit renewal application, the facility submitted an application for non-road engine determination of 3 portable generators (262 KW, 1600KW and 400 KW). The Department determined that these engines met the criteria for determination as non-road engines. Consequently, these engines were not considered for emission calculations, and are deleted from the equipment list.

II. PROCESS DESCRIPTION

Mining at Phelps Dodge Miami consists of six primary activities:

- (1) Drilling and Blasting,
- (2) Loading,
- (3) Ore and waste hauling,
- (4) Leaching,
- (5) Solvent Extraction, and
- (6) Electrowinning at the Tankhouse.

1. Drilling and Blasting

Ore and overburden are drilled for placement of ANFO (Ammonium Nitrate and Fuel Oil) explosives. Drilling operations result in fugitive emissions of Particulate Matter (PM) and Particulate Matter less than 10 microns (PM₁₀).

After the holes are drilled they are filled with explosive and blasting is carried out. Blasting results in fugitive emissions of PM, PM₁₀ and some products of combustion (such as sulfur dioxide (SO₂), Carbon Monoxide (CO), and Nitrogen Oxides (NO_x)).

2. Loading

Ore, waste rock, and overburden from the mining pits that have been drilled and blasted is loaded into haul trucks for transport. The rock is scooped up by power shovels, loaders or other means and dropped into the beds of large off-road haul trucks. Loading operations result in fugitive emissions of PM and PM₁₀.

3. Hauling

Waste rock and ore are hauled by large off-road trucks from the mine pits to waste rock storage areas and to leach pads respectively. Like most surface mines, the truck haul activity on unpaved roads is the principal source of fugitive dust.

4. Leaching

The leaching process is the method by which copper is removed from the ore. The haul trucks place their loads of ore onto leach pads. Weak sulfuric acid is sprinkled onto the pads. The acid solution trickles through the pads and dissolves copper. The resulting leachate is captured below the leach pads for processing. The ore placement results in fugitive emissions of PM and PM₁₀. Small quantities of fugitive sulfuric acid emissions occur during the sprinkling process.

5. Solvent Extraction

The copper rich acid solution that trickles through the leach pads is sent to the solvent extraction (SX) feed tank, and then piped to the extraction circuit of the solvent extraction facility. The extraction process separates the copper from the copper-laden feed, and returns the weak copper and acid to a holding tank for re-use in leaching. The loaded organics of copper are sent to two vented surge tanks. Volatile Organic Compound (VOC) emissions occur at the surge tanks due to breathing and working losses. Other point sources of VOC emission from the solvent extraction system are the “diluent storage tank”, and the “grunge storage tank”. Fugitive VOC emissions also occur during extraction and in subsequent handling of aqueous streams which contacted the organic phase.

6. Tankhouse

The loaded strip solution from the solvent extraction plant is pumped into the electrowinning tanks at the tankhouse for copper recovery. An electric current is applied through the tankhouse solution, which causes copper in the acid solution to plate out as cathodes. When the solution copper values are substantially depleted, the cathodes are removed and the acid solution is returned to the SX facility. The solution used in the

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tankhouse must be heated to promote copper recovery. This heat is supplied by three steam boilers. These boilers are point sources of emissions. The boilers typically use Natural Gas as fuel. However, during periods of gas curtailment, the boilers have the capability to burn distillate (#2) fuel oil. The pollutants emitted from the steam boilers are PM, SO₂, NO_x, CO and VOC. The operations also result in small amounts of fugitive emissions of sulfuric acid and methylene chloride (used for cleaning equipment during maintenance).

III. EMISSIONS

The facility has the potential to emit NO_x and SO₂ in excess of the major source threshold. Enforceable operation limitations (operating hours and fuel with sulfur less than 0.05%) were voluntarily proposed by the Permittee to limit total facility NO_x and SO₂ emissions to stay below the major source threshold. While firing fuel oil in the boilers, the facility will limit the annual operation of all boilers to maximum 13000 hours. Also, the facility will limit the operation of emergency diesel generators to a maximum of 500 hours per year. Total facility-wide potential emissions of NO_x and SO₂, incorporating enforceable permit limitations, are each less than 100 tpy. The facility has a lead melting pot for melting lead to cast plugs and hammers. Maximum annual usage of lead is permitted at 4000 pounds. Facility-wide potential emissions of hazardous air pollutants (HAP) are below 10 and 25 tpy for individual and total combined HAP, respectively. Therefore, the facility is not a major source of HAP emissions for the purposes of CAA Section 112 and Article 11 of A.A.C. Title 18, Chapter 2.

Table-1 below provides the summary of emissions from various sources as well as facility wide potential-to-emit (PTE).

Table-1

Pollutant	Generators	Tanks	Boilers	Misc Heaters	Lead Melting pot	Total
	tpy	tpy	tpy	tpy	tpy	tpy
PM ₁₀	0.49	0.00	4.29	2.31	0.22	9.41
SO ₂	3.60	0.00	74.68	0.18	3.44	18.75
NO _x	13.37	0.00	40.22	28.58	1.20	89.62
CO	10.44	0.00	35.80	12.16	0.11	51.13
VOC	1.23	62.93	2.34	1.67	1.67	71.06
Lead	0.00	0.00	0.00	0.00	0.0015	0.00

Notes:

1. Tanks emissions are based on Tanks program.
2. All other emissions are based on AP-42 emission factors.
3. Emissions for emergency generators are for 500 hours of annual operation.
4. Emissions for boilers are for 13000 hours of operation on diesel/distillate fuel firing and natural gas firing for remaining hours.
5. Diesel/distillate fuel for boilers is limited to 0.05% sulfur content.

IV. COMPLIANCE HISTORY

Seventeen (17) air quality inspections were carried out since year 2000. A Notice of Correction (NOC) -Case no. 23061- was issued based on inspection on July 16, 2002. The facility was cited

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for failure to maintain records. The NOC was subsequently closed.

V. APPLICABLE REGULATIONS

Table 2 identifies the applicable regulations and also provides verification as to why that standard applies.

Table 2: Verification of Applicable Regulations

Unit	Control Device	Rule	Verification
Tankhouse Boilers #1 and #2, Water heater, lead pot, and other miscellaneous heaters	N/A	A.A.C. R18-2-724	Applicability date for NSPS Subpart Dc is June 1989. Tankhouse boilers #1 and #2 were installed in March 1989. Hence this subpart is not applicable to boilers #1 and #2. Also, Subpart Dc is not applicable to water heater, lead melting pot, and other heaters as these are less than 10.0 MMBtu. Thus, A.A.C. R18-2-724 is applicable to all these equipment.
Tankhouse Boiler #3	N/A	40 CFR 60 Subpart Dc	NSPS Subpart Dc applicable to units with heat input capacity in the range of 10 Million BTU/hr to 100 Million BTU/hr. Applicability date for NSPS Subpart Dc is 6/89. This boiler was installed in 1997.
Emergency Diesel Generators	N/A	A.A.C. R18-2-719	Applicability date for NSPS Subpart III is 2006. Since these generators were installed prior to 2006, this is not applicable. Hence, A.A.C. R18-2-719 is applicable to these generators.
Electrowinning/ Solvent extraction operations, miscellaneous storage tanks.	N/A	A.A.C. R18-2-730	This standard is applicable to unclassified sources.
Gasoline storage tanks	N/A	A.A.C. R18-2-710	NSPS subparts K, Ka and Kb are not applicable to gasoline tanks as the capacity of these tanks is 1000 gallons. A.A.C. R18-2-710 is applicable to storage tanks handling petroleum liquids, and, hence, applicable to gasoline storage tanks.
Fugitive dust sources	Water and other reasonable precautions	Article 6, A.A.C. R18-2-702	These are applicable to fugitive dust sources at the facility.

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Mobile sources	Water Sprays/Water Truck for dust control	Article 8	This Article is applicable to off-road mobile sources, which either move while emitting air pollutants or are frequently moved during the course of their utilization.
Spray painting operations	N/A	A.A.C. R-18-2-727	This standard is applicable to any spray painting operation.
Demolition/renovation operations	N/A	A.A.C. R18-2-1101.A.8	This standard is applicable to any asbestos related demolition or renovation operations.

VI. PREVIOUS PERMIT CONDITIONS

Table 3 compares the conditions in Permit No. 1000442 with the conditions in this permit and cross-references the previous permit conditions to their location in the new permit.

Table-3

Condition # in permit nos. 1000442	Determination				Comments
	Delete	Kept	Revise	Streamline	
Attachment A			x		This Attachment has been revised and most recent Attachment “A” is used for this permit.
Attachment B					
Conditions I.A		x			This Condition for fuel sulfur limitation is renumbered as II.B.1
Condition I.B.1		x			This condition for Opacity standard is renumbered as II.C.1.c.
Conditions I.B.2		x			This reporting requirement for opacity is renumbered as II.C.2.d.
Condition I.C.1		x			This condition for particulate matter emission limitation and standards is relocated as II.C.1.a.
Condition I.C.2		x			This record-keeping requirement for natural gas is relocated as Condition II.C.2.a.
Conditions II.A and II.B.1		x			These fuel requirements are relocated as II.B.1.
Condition II.B.2		x			This record keeping requirements for fuel oil is renumbered as II.C.2.b.

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Condition II.B.3.a		x			This operating hours limitation has been relocated as Condition I.A.3.
Condition II.B.3.b		x			This operating hours monitoring and record keeping requirement has been relocated as Condition I.B.2.
Condition II.C.a		x			This condition for Opacity standard is renumbered as II.C.1.c.
Condition II.C.b		x			This monitoring, reporting and recordkeeping requirement for opacity is renumbered as II.C.2.c and d.
Condition II.D.1		x			This condition for particulate matter emission limitation and standards is relocated as II.C.1.a.
Condition II.D.2		x			This record keeping requirements for fuel oil is renumbered as II.C.2.b.
Condition II.E.1		x			This condition for SO2 emission standard is relocated as Condition II.D.1.
Condition II.E.2		x			This SO2 monitoring requirement is relocated as Condition II.B.2.
Condition III.A/IV.A		x			This fuel requirement for NSPS boiler is relocated as Condition III.C.1.
Condition III.B		x			This Condition for monitoring of fuel usage is relocated as Condition III.C.2.
Condition IV.B.1.a		x			This Condition for fuel oil sulfur limitation is relocated as Condition III.E.1.a.
Condition IV.B.1.b		x			This fuel oil monitoring requirement is relocated as Condition III.E.2.b.
Condition IV.B.2.a		x			This operating hours limitation for fuel oil-fired boilers is relocated as Condition I.A.3.
Condition IV.B.2.b		x			This monitoring requirement for operating hours while firing fuel oil is relocated as Condition I.B.2.
Condition IV.C.1		x			This condition for emission limitation and standards for NSPS boiler is relocated as III.D.1.
Condition IV.C.2		x			This condition for opacity monitoring for NSPS boiler is relocated as Condition III.D.2.
Condition IV.C.3		x			This testing requirement for NSPS boiler is relocated as Condition III.D.3.

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Condition IV.D.1		x			This condition for fuel oil sulfur limitation for NSPS boiler is relocated as III.E.1.a.
Condition IV.D.2.a		x			This condition for fuel oil monitoring requirements is relocated as Condition III.E.2.
Condition IV.D.2.b		x			This record-keeping requirement for NSPS boiler is relocated as Condition III.C.2.
Condition V.A		x			This fuel limitation condition for miscellaneous fuel burning equipment is relocated as Condition IV.B.
Condition V.B.1		x			This condition for opacity standards for miscellaneous fuel burning equipment is relocated as Condition IV.C.1.c.
Condition V.B.2		x			This requirement for monitoring opacity for miscellaneous fuel burning equipment is relocated as Condition IV.C.2.c.
Condition V.C.1		x			This condition for particulate matter emission limitation and standards for miscellaneous fuel burning equipment is relocated as Condition IV.C.1.a.
Condition V.D.1		x			This condition for SO ₂ emission standards for miscellaneous fuel burning equipment is relocated as Condition IV.D.1.
Section VI			x		This Section for fugitive emission from non-point sources has been renamed and relocated as Section VIII.
Condition VII.A.1		x			This condition for opacity standards for stationary rotating machinery is relocated as Condition V.D.1.c
Condition VII.B.1		x			This condition for particulate matter standards for stationary rotating machinery is relocated as Condition V.D.1.a.
Condition VII.C.1					This condition for SO ₂ emission standards for stationary rotating machinery is relocated as Condition V.E.1.
Section VIII		x			This section for mobile sources requirements has been relocated as Section IX.
Condition IX.A		x			This condition for emission limitation standards for leaching and solvent extraction operations is relocated as Condition VI.C.1.

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Condition IX.B		x			This condition for air pollution control requirements for leaching and solvent extraction operations is relocated as Condition VI.C.2.
Condition IX.C		x			This condition for monitoring requirements for leaching and solvent extraction operations is relocated as Condition VI.C.3.
Section X		x			This section for facility-wide requirements has been relocated as Section I.
Section XI		x			This section for Emergency generators has been relocated as Section V.
Section XII		x			This section for gasoline storage tanks has been relocated as Section VII.
Section XIII		x			This section for other periodic requirements has been relocated as Section X.

VII. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS

- A. The Permittee is required to have a visual observation plan for monitoring of fugitive emissions. The Permittee is required to conduct a bi-weekly (once in 2 weeks) visual survey of the fugitive emissions in accordance with the observation plan. If any observation appears to exceed the opacity standard, the Permittee must conduct and record a proper Method 9 observation. If this observation is in excess of the opacity standard, suitable corrective action shall be taken and also reported to ADEQ as an "excess emission".
- B. The Permittee is required to conduct surveys of visible emissions from the boiler stacks bi-weekly (once every two weeks) and from the stacks of the emergency generators once for every 100 hours of operation. If any observation appears to exceed the opacity standard, the Permittee must conduct and record a proper Method 9 observation. If this observation is in excess of the opacity standard, suitable corrective action must be taken and also reported to the agency as an "excess emission".
- C. The Permittee is required to maintain records of monthly and rolling 12-month total operating hours for the standby diesel generators.
- D. The Permittee is required to record daily, monthly and 12-month total of hours of operation of boilers, while firing fuel oil/distillate oil.
- E. The Permittee is required to maintain records fuel supplier certification document showing the name of the fuel supplier, the typical heating value of the fuel, and the maximum sulfur content to demonstrate compliance.

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VIII. INSIGNIFICANT ACTIVITIES

The applicant has requested the following activities to be deemed as “insignificant”. According to A.A.C. R18-2-101.57, for an activity to be deemed “insignificant”, there should be no applicable requirement for the activity. This was the basis used to determine if the activities in the following list qualify as an “insignificant” activity under Arizona law.

S. No.	INSIGNIFICANT ACTIVITY NAME	YES/NO	REASON
1	100 gal Diesel Tank (Steam Cleaner)	Yes	A.A.C. R18-2-101.57 (a)
2	550 gal Gasoline Tank (Tankhouse)	Yes	A.A.C. R18-2-101.57 (j)
3	54000 gal Diesel Tank (Fuel Island)	No	A.A.C. R18-2-730
4	12000 gal Diesel Tank (Fuel Island)	Yes	A.A.C. R18-2-101.57 (a)
5	Two 1000 gal Gas Tanks (Warehouse)	Yes	A.A.C. R18-2-101.57 (j)
6	1000 gal Gas Tank (SX Plant)	Yes	A.A.C. R18-2-101.57 (j)
7	1000 gal Diesel Tank (SX Plant)	Yes	A.A.C. R18-2-101.57 (a)
8	Degreaser (Central Maintenance)	Yes	A.A.C. R18-2-101.57 (j)
9	1000 gal Degreaser Storage	Yes	A.A.C. R18-2-101.57 (j)
10	Gas and Diesel Pumps	Yes	A.A.C. R18-2-101.57 (j)
11	Gas and Diesel Welders	Yes	A.A.C. R18-2-101.57 (j)
12	Propane Tank	Yes	A.A.C. R18-2-101.57 (j)
13	Diesel fuel storage tanks less than 40,000 gal (Tank #s 16, 24, 25, 33, 38)	Yes	A.A.C. R18-2-101.57 (a)
14	Gasoline storage tanks 10,000 gal each (Tank #s 19, 20)	No	A.A.C. R18-2-710
15	Acid storage tanks	Yes	A.A.C. R18-2-101.57 (j)
16	Ammonium nitrate silos (2)	Yes	A.A.C. R18-2-101.57 (j)
17	Degreaser in maintenance shop	Yes	A.A.C. R18-2-101.57 (j)
18	30,000 gal diluent storage tank (SX)	No	A.A.C. R18-2-730
19	11,000 gal grunge storage tank (SX)	No	A.A.C. R18-2-730
20	80,000 gal organic surge storage tanks (2) (SX)	No	A.A.C. R18-2-730
21	Mixer settler tanks (SX)	No	A.A.C. R18-2-730
22	4-25,000 gal electrolyte surge storage tanks (SX)	No	A.A.C. R18-2-730
23	100 gal diesel fuel storage tank at fire pump (SX)	Yes	A.A.C. R18-2-101.57 (a)
24	1000 gal gasoline storage tank (SX)	Yes	A.A.C. R18-2-101.57 (j)

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S. No.	INSIGNIFICANT ACTIVITY NAME	YES/NO	REASON
25	8-2700 gal electrolyte filters (SX)	Yes	A.A.C. R18-2-730
26	AFF foam storage tanks (SX)	Yes	A.A.C. R18-2-101.57 (j)
27	LP storage tanks (SX)	Yes	A.A.C. R18-2-101.57 (j)
28	Electrowinning cells in tankhouse (EW)	No	AACR18-2-730
29	Starter sheet preparation equipment (EW)	Yes	A.A.C. R18-2-101.57 (j)
30	2 - 375000 gal electrolyte storage vessels (EW)	No	AACR18-2-730
31	1000 gal diesel storage tank (EW)	Yes	A.A.C. R18-2-101.57 (a)
32	1000 gal gasoline storage tank (EW)	Yes	A.A.C. R18-2-101.57 (j)
33	Electrolyte and wastewater surge storage tanks (EW)	Yes	AACR18-2-730

IX. LIST OF ABBREVIATIONS

A.A.C. Arizona Administrative Code
ADEQ Arizona Department of Environmental Quality
AQD Air Quality Division
CO Carbon Monoxide
HAP Hazardous Air Pollutant
hpHorsepower
hr Hour
IC Internal Combustion
lb Pound
m Meter
MMBtu Million British Thermal Units
NAAQS National Ambient Air Quality Standard
NO_x Nitrogen Oxide
PM Particulate Matter
PM₁₀ Particulate Matter Nominally less than 10 Micrometers
PTE Potential-to-Emit
SO₂ Sulfur Dioxide
TPY Tons per Year
VOC Volatile Organic Compound
Yr Year